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# BLACK SPOT OF CITRUS,

# GUIGNARDIA CITRICARPA (PHYLLOSTICTINA CITRICARPA)

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Black spot, caused by the fungus Guignardia citricarpa Kiely [Phyllostictina citricarpa (McAlp.) Petrak], is a rind-blemishing disease of citrus fruits. It causes annual losses in the millions of dollars in areas of Australia and South Africa (3). Losses have exceeded 80% of the crop in both of these countries (2). The disease has been reported from all continents except North America (4).

All commercially grown citrus is susceptible to this pathogen with the exception of sour orange, Citrus aurantium L., and its hybrids (4). Lemons are highly susceptible, but great losses may occur on Valencia and Navel oranges and grapefruit (4).

Although the disease has been reported in many countries and on many hosts other than citrus, these reports may be misleading. McOnie (5) described an isolate of Guignardia sp. which resembled G. citricarpa but which did not cause the black spot symptoms.

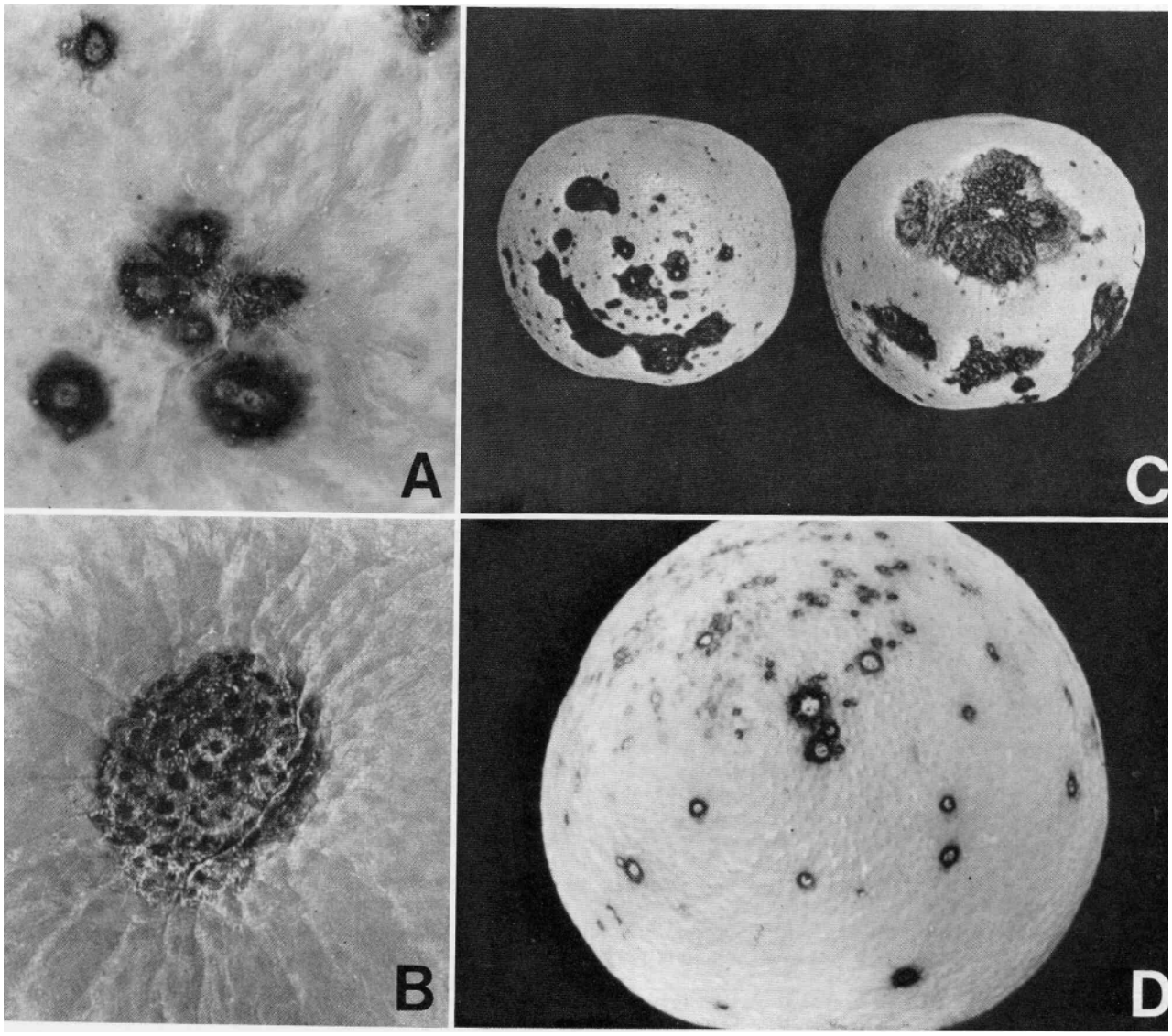


Fig. 1. Black spot of citrus: A) Hard spot lesions on Valencia orange; B) Close-up of individual black spot lesion; C) Virulent lesions on grapefruit held in warm storage; D) Freckle and hard spot lesions on valencia orange at harvest. (Photographs courtesy of Dr. E. C. Calavan; DPI Photos #70254613, #702546-8 #702546-2, #702546-5.)

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Black spot, predominantly a fruit disease, causes unsightly lesions on the rind which make the fruit unfit for the fresh fruit market (4). Trees which are under stress from other factors are most susceptible to attack from G. citricarpa. Because the fungus infects only young tissue and remains dormant until temperatures reach 70 F (22 C), symptoms often develop only after harvest (1).

SYMPTOMS. Fruit spots, which may range in number from one to more than 1,000 on a single fruit, first appear as small sunken spots with a light reddish brown color. Each spot normally measures 1/25 to 1/4 inches (1 to 6 mm) in diameter, but under ideal disease conditions may attain a diameter of one inch (25 mm) or more and often coalesce with other lesions to form large, irregular, unsightly lesions.

Fruit symptoms vary but may be assigned to three groups: (1) hard or shot-hole spot, (2) freckle spot, and (3) "virulent" or spreading spot (1).

Hard spots usually appear between the beginning of yellow coloration and maturity. A small crater, usually gray to tan but occasionally brown or black, forms in each hard spot. The rim of the crater is of a darker color. Those spots which develop on a green fruit retain a green halo after the fruit turns yellow. Hard spot lesions are shallow and after prolonged storage become slightly elevated (Fig. 1A and 1B).

Freckle spot symptoms occur on mature fruit of oranges and grapefruit, usually after harvest but may appear on both mature and immature lemons. Spots first appear as small, slightly depressed, red dots. Individual spots normally remain small but under favorable disease conditions, particularly in storage, rapidly enlarge and darken to brownish black. Several spots may coalesce to form "virulent" spots.

"Virulent" spots appear primarily on fruit stored at 70 F (22 C) but on occasion may be found on mature non-harvested fruit, primarily lemons. "Virulent" spot is the most damaging form of black spot because unlike the other lesions, it extends deeply into the peel (Fig 1C).

Not all "virulent" lesions begin as coalescing freckle spots. They may first appear on fully mature stored fruit as irregular depressed areas the same color as the peel. They eventually turn brown to black, develop a leathery texture, exceed 1/2 inch (13 mm) in diameter, and may even cover the entire fruit. A red margin may develop around the dark sunken areas (Fig. 1D). Those fruit which are severely infected prior to harvest may drop prematurely.

The black spot pathogen may also attack leaves and small twigs. Symptoms first appear on mature leaves and petioles as tiny circular red to red-brown spots, visible on both leaf surfaces. Midvein lesions are usually restricted to the lower leaf surface. With time, the centers of the spots darken with a dark brown to black ring. Spots remain small, usually not exceeding 1/8 inch (3 mm). Leaf lesions often have yellow halos. These symptoms are not unique for black spot; similar symptoms may be caused by other citrus pathogens.

CONTROL. Since black spot is not currently found in the U. S., no fungicides are EPA-approved for control. In South Africa, spray oil plus copper, mancozeb, or preferably benomyl have given good control of the disease (4).

SURVEY AND DETECTION. This disease is primarily a post-harvest disease. Consequently, greatest attention should be given to citrus fruit in packing houses and fresh fruit outlets.

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